

# PATENT SPECIFICATION

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DRAWINGS ATTACHED.



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## COMPLETE SPECIFICATION.

### Improvements relating to Shot-Guns.

I, JOHN EYTON ORR, a British Subject, of Iva-Craig, Craigavad, County Down, Northern Ireland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to guns or rifles hereinafter referred to for convenience and not in any limiting sense as guns, of the kind which can be broken or opened at the breech by movement of the barrel and refers primarily to ejector mechanism therefor.

The invention is applicable to both single barrelled guns of this kind as well as to double barrelled guns of either the side-by-side type or those having barrels disposed one above the other usually termed "under and over" guns but to simplify the disclosure of the invention reference will hereinafter be made to "the barrel" of the gun as denoting generically either a single or a double-barrelled assembly.

Many forms of ejector mechanism have been constructed and proposed which will automatically provide for either extraction of an unfired cartridge at a controlled speed, or initial extracting displacement of a fired, expanded, or obturated cartridge with sufficient force to overcome the resistance to extraction arising from said expansion or obturation, such extraction being followed automatically by ejection of the cartridge when the breech has been opened to an extent to permit such ejection.

Most of these prior ejector mechanisms have involved the employment of spring loaded over-dead-centre hammers or tumblers pivotally mounted at the underside of the barrel in the vicinity of the knuckle joint which defines the pivotal axis about

which the barrel moves when the gun is broken.

The object of the present invention is to provide a new or improved construction of ejector mechanism which is of simple form and can be manufactured and assembled without incurring high production cost and yet which is robust and reliable in operation.

According to the invention there is provided in a gun ejector mechanism comprising in combination an extractor member including an extractor leg slidable in a guide extending lengthwise of and in the barrel block, and an extractor plate or finger for engaging beneath the rim of a cartridge in said barrel, a compression member mounted for sliding movement lengthwise of the extractor leg and having a part disposed in the rearwardly extending path of a driving member on a forward extension of the action body of the gun adjacent to the pivotal axis about which the barrel moves when the gun is broken so that the compression member is then engaged and moved rearwardly by the driving member, and a coiled spring interposed operatively between the compression member and the extractor, the compression member having a positively limited lost motion connection with the extractor leg which permits the compression member to stress the spring during initial rearward movement and which subsequently causes positive rearward extraction movement of the extractor to effect extraction of a cartridge, the stressing of the spring being temporarily maintained by a retaining member movable into an operative position in response to firing of the barrel by a rod extending between the firing mechanism and a region adjacent to said pivotal axis and moving endwise in dependence upon firing of the gun, said retaining member being

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movable into an inoperative position by, or in timed relation with, movement of the compression member during breaking of the gun so as to release the stored energy in the spring to the extractor when extraction movement thereof has been effected, and causing further rearward movement to be imparted to the extractor at a speed sufficient to eject the cartridge.

The expression "barrel block" is to be deemed to include in addition to a separate block like member in which one or more barrels are mounted an integral thickening of the barrel wall at the rearward end of the barrel assembly in a construction wherein a structurally separate barrel block is not utilised.

The expression "compression member" as employed in the foregoing statement broadly defining the invention and in Claim 1 is not to be deemed to limit the invention to the employment of a coiled compression spring although this will be the form normally employed, since it is to be understood that if desired this spring may be a tension spring.

The rod which moves the retaining member into its operative position is preferably the cocking rod of the gun.

The compression member may be slidably mounted at the forward end of the extractor leg at a position adjacent to and above the pivotal axis about which the barrel moves when the gun is broken and on the same or substantially the same horizontal level as the extractor leg, and the coiled spring is a helically coiled compression spring disposed in the guide in which the extractor leg operates and within or substantially within the length of the extractor leg.

In one form of the invention the extractor leg may be hollow and the coiled spring may be housed within it, the compression member entering into the forward end of the extractor leg and having a rearwardly facing abutment face co-operating with a forwardly facing abutment face at the forward end of the ejector leg, these faces being initially separated from each other to provide said lost motion.

In another form of the invention the extractor leg may be in the form of a bar and the coiled spring may be mounted alongside the extractor leg in the guide, the compression member having a pin and slot or similar connection with the forward end of the extractor leg to provide said lost motion.

If desired, the coiled spring may be arranged to act upon the extractor through the intermediary of a striker comprising a rod-like member and parallel to the extractor leg, the retaining member co-operating with this striker firstly to hold it against rearward endwise movement when the

spring is being stressed by the compression member and secondly to release it so that it delivers a rearwardly directed blow to the extractor to cause ejection of the cartridge.

Alternatively the coiled spring may be arranged to act directly upon the extractor in which case the retaining member co-operates with the latter firstly to permit it to be moved positively rearwardly by the compression member, secondly to hold it whilst the spring is being stressed by the compression member, and thirdly to release it and allow it to be accelerated rearwardly by the stressed spring to cause ejection of the cartridge.

The invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a view in side elevation and partly in cross section of one construction of ejector mechanism according to the invention, the part of the mechanism being shown in the positions which they occupy when the breech of the gun is closed preparatory to firing the gun.

Figure 2 is a similar view of the same construction, the parts of the mechanism being shown in the position which they occupy when the gun has been fired and when the breech has been opened to an extent to effect extraction of a fired cartridge preparatory to ejection of the fired cartridge.

Figure 3 is a view similar to Figure 1 showing another construction of the invention, in this case the parts of the mechanism being shown in the positions which they occupy when the gun has been fired but before the breech is opened.

Figure 4 is a fragmentary plan view of the construction shown in Figure 3 also partly in cross section; and

Figure 5 is a view similar to Figure 3 the parts of the mechanism being shown in the positions which they occupy when extraction of a fired cartridge has taken place but before this cartridge has been ejected.

Referring firstly to the construction shown in Figures 1 and 2 the ejector mechanism comprises an extractor member including an extractor plate or finger 10 and an extractor leg 11, the latter being mounted in a guide consisting of a bore extending longitudinally in the barrel block 12 and opening its rearward end into the recess 13 in the barrel block in which the extractor plate or finger 10 is accommodated with the breech is closed. This latter position is shown in Figure 1 wherein the standing breech 14 of the action body is shown in abutting relation with the rearward face of the extractor plate or finger 10.

It will be understood that the extractor plate or finger is adapted in the conventional manner to enter beneath the rim of a cartridge placed in the breech, so that to effect extraction and ejection of the cartridge it is

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necessary that the extractor plate or finger should be moved rearwardly.

As seen in Figure 1 the bore in which the extractor leg 11 is slidably mounted for endwise movement is somewhat enlarged at its forward end as indicated at 15, and the forward end of the extractor leg is provided externally with a collar 6 secured on the extractor leg in any suitable manner as for example by brazing, welding or by screwing so as to limit rearward movement of the extractor member during opening of the breech.

Entering the forward end of the tubular leg 11 is the rearward end portion of a compression member 16, this end portion being formed as a hollow spigot 17 or being of other suitable form to enter within the tubular leg 11. Abutting the rearward end of the spigot 17 is a coiled compression spring 18 accommodated in the interior of the tubular leg 11 and at its rearward end abutting the head 19 of a rod-like striker 20 also assembled within the leg 11.

The striker 20 passes through the interior of the spigot 17 of the compression member and at its forward end has a further head 21 which may be in the form of a collar detachably secured to the striker as for example by a set screw 22.

At its forward extremity the body of the compression member includes a downwardly projecting lug 23 which lies in the path of a driving member in the form of a projecting pin 24 secured between forward extensions 25 of the side plates of the action body of the gun.

The lug 23 and the driving member 24 are disposed adjacent to and above the knuckle joint between the barrel assembly and the forward extension of the action body, the components of this knuckle joint being indicated at 26 and 27.

Further the ejector mechanism comprises a retaining member which may be in the form of a bell-crank lever 28 pivotally mounted upon a pin or screw 29 for movement about an axis parallel to that of the knuckle joint and having a downwardly projecting arm 30, and a forwardly projecting horizontal or approximately horizontal arm 31, the upper face of which is formed with a detent 32 for co-operation with a recess 33 in the collar 21 of the striker. The lower extremity of the arm 30 is engaged by a projection 34 on a cocking rod 35. It will be understood that the cocking rod 35 may form part of a known type of cocking mechanism wherein the cocking rod is permitted to move rearwardly during breaking of the gun under influence of the firing spring, the cocking rod being retained in the rearward position until firing has occurred, whereupon it is driven forwardly.

Rearward movement of the cocking rod

during breaking of the gun is controlled by a lump 36 on the barrel block which engages with an abutment 37 at the forward end of the cocking rod.

The ejector mechanism as above described operates as follows. When the gun is fired forward movement of the cocking rod rotating the bellcrank lever clockwise enters the detent 32 into the recess 33, the forward lower corner of this recess being somewhat rounded to facilitate entry of the detent and if necessary to permit the striker to be moved forwardly by entry of the detent acting camwise of this rounded corner.

When the gun is broken the driving member 24 moves in an arcuate path relatively to the barrel block around the axis of the knuckle joint and in a clockwise direction, so that it drives the compression member 16 rearwardly.

It will be observed that between the shoulder 38 at the forward end of the spigot and the forward end face 39 of the extractor leg there is a gap 40 resulting in a lost motion connection between the compression member and the extractor leg which, however, is positively limited by engagement of the abutting shoulder and end face 38 and 39 respectively.

During the time when this lost motion is being taken up by rearward movement of the compression member the coiled spring 18 is undergoing compression, its rearward end being held by the head 19 of the stationary striker 20.

When the shoulder and end face 38 and 39 abut, the extractor member is thereafter moved rearwardly positively to effect positive extraction of the expanded or obturated cartridge at a controlled speed which is not sufficient to cause it to be ejected, the extremity of this positive extraction movement being indicated in Figure 2 of the drawings.

Having attained this position the rearward lower corner of the lug 23, which, as indicated at 41, will be observed to be of somewhat rounded convex form, is brought into engagement with the opposed rounded convex face 42 of the arm 31 of the retaining member, thereby co-operating camwise therewith and moving the retaining member from its operative position to an inoperative position as seen in Figure 2 wherein the detent 32 is withdrawn from the recess 33.

This allows the striker to be accelerated rearwardly by the compression spring 18, so that the head 19 strikes a blow against the blind end face 43 at the rearward end of the extractor leg and moves the extractor member rearward at high velocity to cause the extracted and hence loosened cartridge to be ejected clear of the breech.

In extracting a cartridge from the breech

of the gun when the breech has been closed but the gun not fired the breech is opened whilst the cocking rod 35 remains in its rearward position and whilst the retaining member hence remains in its inoperative position. The striker 20 therefore is never retained against rearward movement so that positive extraction movement is applied to the extractor leg by the abutting shoulder and end face 38 and 39 but the coiled spring 18 is never stressed. Under these conditions only extraction at a controlled rate is performed and ejection does not occur during the further opening of the breech.

In the construction shown in Figure 3 the extractor member again comprises an extractor plate or finger 44 which may be of similar form to the extractor plate or finger 10, but in this case the extractor leg 45 is in the form of a bar which is mounted in a guide channel of dove-tailed cross section in the side face of the barrel block. Alongside the extractor leg and also within the guide is disposed a coiled compression spring 46 and the compression member in this case has, as before, a positively limited lost motion connection with the extractor leg, this being effected by means of a pin 47 on the compression member 48 engaging in a longitudinally extending slot 49 in the extractor leg at the forward end thereof.

The compression member is moved rearwardly as before by means of a driving member such as a pin 50 secured to forward extensions of the action body above and adjacent to components 51 and 52 of the knuckle joint between the barrel assembly and the action body. In this construction the compression member is provided with two downwardly projecting lugs 53 and 54 one behind and the other in front of the driving member 50.

The retaining member 55 in this construction is slidably mounted in a guide in the barrel block extending perpendicularly or in other appropriate transverse relation to the guide in which the extractor leg is mounted, the lower end face 60 of the retaining member being inclined to co-operate with a projection on a cocking rod (not shown) similar to the cocking rod 35.

The upper end of the retaining member 55 which is in the form of a detent 56 enters a recess 57 in the lower edge of the extractor leg 45 the length of this recess being such that there is lost motion between the extractor leg in its direction of permitted movement and the retaining member, such lost motion being positively limited by engagement of the forward end face 58 of the recess with the opposed abutting and forwardly facing face of the detent 56.

The operation of this construction of ejector member is as follows. Upon firing

of the gun the retaining member 55 is moved into its operative position as seen in Figure 3 wherein the detent 56 enters the recess 57 at a position intermediate the ends thereof.

When the gun is broken the expanded or obturated cartridge which offers considerable resistance to extraction will normally prevent movement of the extractor member in a rearward direction by virtue of compression of the spring 46 which results from the rearward movement of the compression member 48, the rearward lug 53 of the latter being engaged by the driving member 50 in its rearward arcuate path of movement.

Thus the spring 46 will continue to be compressed until the pin 47 of the compression member engages the rearward end 59 of the slot 49 in the extractor leg.

When this engagement occurs, positively limiting the lost motion between the compressor member and the extractor leg, the latter is moved positively rearwardly to effect extraction of the cartridge, and under these conditions it will be evident that the rearwardly facing forward end of the recess 57 approaches the forwardly facing face of the detent 56, engagement of these two faces ultimately positively limiting rearward movement of the extractor.

Such engagement is, however, prevented from occurring by engagement of the rearward lower corner 61 of the lug 53 with an inclined cam face 62 on the retaining member, the inclination being such that the retaining member is moved downwardly to its inoperative position just before the face 58 and detent 56 engage. In practice these may sometimes engage by virtue of the fact that the initial positive movement imparted to the extractor leg by the pin 47 will be sufficient to loosen the cartridge in the breech, and the degree of compression already established in the spring 46 will then be sufficient to remove the extractor member rearwardly, such movement, however, being then limited by engagement of the face 58, and detent 56. However, even if this occurs the retaining member will be moved to its inoperative position before there is any conflict between the positive retention of the extractor member and the positive rearward movement thereof by the pin 47.

Upon movement of the retaining member to its inoperative position the spring 46 accelerates the extractor member rearwardly and attains a velocity sufficient for the cartridge to be ejected clear of the breech.

If the gun is broken without firing the retaining member 55 remains in its inoperative position as seen in Figure 5 in which case extraction movement only is imparted to the extractor member at a controlled speed determined by the speed of opening the breech either through the intermediary

of the spring 46 (if the cartridge is free from the breech) or through engagement of the pin 47 with the end 59 of the slot 49 in the extractor leg.

5 It will be understood that if desired we may provide in association with an ejector mechanism of the form shown in Figures 3 to 5 a striker which may be in the form of a rod mounted alongside the extractor leg  
10 45. In this case the coiled compression spring would be mounted on the striker which would have a head at its rearward end and a collar or similar member at its forward end, and in this case the detent 55 would be positioned or shaped to co-operate with the collar or member at the rearward end of the striker or with some other part  
15 of the striker disposed forwardly of the compression spring.

20 It will be evident that in respect of all the foregoing constructions as above described rearward movement of the extractor member to the full extent which normally occurs in ejection of a cartridge also occurs  
25 in the case where the cartridge has not been fired, the extractor member then being moved rearwardly at a controlled speed dependent upon the speed of opening of the breech but without any or any significant  
30 compression of the coiled spring so that the speed of movement of the extractor member never attains a value sufficient to cause ejection.

#### WHAT I CLAIM IS:—

35 1. In a gun, ejector mechanism comprising in combination, an extractor member including an extractor leg slidable in a guide extending lengthwise of and in the barrel block, and an extractor plate or finger for  
40 engaging beneath the rim of a cartridge in said barrel, a compression member mounted for sliding movement lengthwise of the extractor leg and having a part disposed in the rearwardly extending path of a driving  
45 member on a forward extension of the action body of the gun adjacent to the pivotal axis about which the barrel moves when the gun is broken so that the compression member is then engaged and moved rearwardly by  
50 the driving member, and a coiled spring interposed operatively between the compression member and the extractor, the compression member having a positively limited lost motion connection with the extractor  
55 leg which permits the compression member to stress the spring during initial rearward movement and which subsequently causes positive rearward extraction movement of the extractor to effect extraction of a cartridge, the stressing of the spring being temporarily  
60 maintained by a retaining member movable into an operative position in response to firing of the barrel by a rod extending between the firing mechanism and a

region adjacent to said pivotal axis and moving endwise in dependence upon firing of the gun, said retaining member being movable into an inoperative position by, or in timed relation with, movement of the  
65 compression member during breaking of the gun so as to release the stored energy in the spring to the extractor when extraction movement thereof has been effected, and causing further rearward movement to be  
70 imparted to the extractor at a speed sufficient to eject the cartridge.

2. In a gun, ejector mechanism according to Claim 1 wherein the rod which moves the retaining member into its operative position is the cocking rod of the gun.

3. In a gun, ejector mechanism according to either of Claims 1 and 2 wherein the compression member is slidably mounted at the forward end of the extractor leg at a position adjacent to and above the pivotal  
85 axis about which the barrel moves when the gun is broken and on the same or substantially the same horizontal level as the extractor leg, and the coiled spring is a helically coiled compression spring disposed  
90 in the guide in which the extractor leg operates and within or substantially within the length of the extractor leg.

4. In a gun, ejector mechanism according to Claim 3 wherein the extractor leg  
95 is hollow and the coiled spring is housed within it, the compression member entering into the forward end of the extractor leg and having a rearwardly facing abutment face co-operating with a forwardly facing  
100 abutment face at the forward end of the extractor leg, these faces being initially separated from each other to provide said lost motion.

5. In a gun, ejector mechanism according to Claim 3 wherein the extractor leg is in the form of a bar and the coiled spring is mounted alongside the extractor leg in the guide, the compression member having  
105 a pin and slot or similar connection with the forward end of the extractor leg to provide said lost motion.

6. In a gun, ejector mechanism according to any one of the preceding Claims 1 to 4 wherein the coiled spring is arranged  
115 to act upon the extractor through the intermediary of a striker comprising a rod-like member parallel to the extractor leg, the retaining member co-operating with this striker firstly to hold it against rearward  
120 endwise movement when the spring is being stressed by the compression member and secondly to release it so that it delivers a rearwardly directed blow to the extractor to cause ejection of the cartridge.

7. In a gun, ejector mechanism according to Claim 6 as appendant to either of Claims 3 and 4 wherein the coiled spring is disposed on the striker and the retaining

member co-operates with a part of the striker at its forward end beyond the forward end of the spring and extractor leg.

8. In a gun, ejector mechanism according to any of Claims 1, 2, 3, and 5 wherein the coiled spring is arranged to act directly upon the extractor, and the retaining member co-operates with the latter firstly to permit it to be moved positively rearwardly by the compression member, secondly to hold it whilst the spring is being stressed by the compression member, and thirdly to release it and allow it to be accelerated rearwardly by the stressed spring to cause ejection of the cartridge.

9. In a gun, ejector mechanism according to Claim 8 wherein the extractor leg has a positively limited lost motion connection with the retaining member, the extent of the lost motion being less than that obtaining in respect of the connection between the extractor leg and the compression member so as to provide for stressing of the coiled spring, the positive limit of the first said lost motion connection being brought into operation when the gun has been fired only in the event that extraction movement is transmitted to the extractor through the spring so that it becomes necessary to hold the extractor to allow stressing of the spring to take place for ejection purposes, the retaining member being moved to its inoperative position before positive rearward movement of the extractor by the compression member would be opposed by the hold effected by the retaining member when in its operative position.

10. In a gun, ejector mechanism according to Claim 9 wherein the retaining member on the one hand, and the compression member on the other hand, co-operate to

effect movement of the retaining member to its inoperative position by the provision of a cam face on at least one of these members positively engaged by a cam face or part on the other of these members.

11. In a gun, ejector mechanism according to any one of the preceding claims wherein the retaining member is a lever pivoted about an axis parallel to said pivotal axis and having a downwardly extending part engageable by said rod.

12. In a gun, ejector mechanism according to any one of Claims 1 to 10 wherein the retaining member is slidably mounted in a guide in the lower part of the barrel block for movement transversely of the extractor leg.

13. In a gun ejector mechanism according to any one of the preceding claims wherein the extractor member is arranged to be moved rearwardly through the same or substantially the same distance by the driving and compression members irrespective of whether firing of the cartridge to be extracted has or has not taken place.

14. In a gun, ejector mechanism substantially as hereinbefore described with reference to and as shown in Figures 1 and 2 of the accompanying drawings.

15. In a gun, ejector mechanism substantially as hereinbefore described with reference to and as shown in Figures 3, 4, and 5 of the accompanying drawings.

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#### PROVISIONAL SPECIFICATION.

#### Improvements relating to Shot-Guns.

I, JOHN EYTON ORR, a British Subject, of Iva-Craig, Craigavad, County Down, Northern Ireland, do hereby declare this invention to be described in the following statement:—

The present invention relates to guns or rifles hereinafter referred to for convenience and not in any limiting sense as guns, of the kind which can be broken or opened at the breech by movement of the barrel and refers primarily to ejector mechanism therefor.

The invention is applicable to both single barrelled guns of this kind as well as to double barrelled guns of either the side-by-side type or those having barrels disposed one above the other usually termed "under

and over" guns but to simplify the disclosure of the invention reference will hereinafter be made to "the barrel" of the gun as denoting generically either a single or a double barrelled assembly.

The object of the invention is to provide a new or improved construction of ejector mechanism which will automatically provide for either extraction of an unfired cartridge at a controlled speed or, initial extracting displacement of fired obturated cartridge with sufficient force to loosen it in the breech followed by ejection of such cartridge when the breech has been opened to an extent to permit such ejection.

According to the invention an extractor member adapted to engage operatively with

a cartridge rim and mounted for movement in a direction rearwardly of the barrel is driven by mechanism actuated upon opening of the breech and including a driving member co-operating with the extractor member to effect initial rearward movement thereof at a controlled speed insufficient to eject an unfired cartridge but exerting sufficient force to extract a fired cartridge, and further including energy storage means selectively rendered active or inactive to communicate to the extractor member or to withhold therefrom a further complement of energy at a force sufficient to cause ejection of a cartridge which has undergone extraction in consequence of said initial movement in dependence upon the firing or non-firing of the gun prior to opening the breech.

The energy storage may comprise a spring which is arranged to be stressed during initial opening of the breech in dependence upon the gun having been fired, and stored energy from the spring is communicated to the extractor member at a predetermined position of breech opening through release of an intermediary striker impinging on the extractor member and driven by the spring and previously retained in a spring stressing position.

Alternatively the extractor member could be formed as a composite member one part being operated to perform the extraction function and a further part associated operatively with said energy storage means performing the ejection function.

Further, the energy storage means, may be in the form of a spring which is stressed either during closure or opening of the breech but from which energy is released to the extractor member only in dependence upon firing of the gun having taken place prior to opening of the breech.

In one arrangement according to the invention the extractor member has a hollow shank slidably mounted in a longitudinal opening in the barrel adjacent to the bore, and a spring loaded striker mounted for sliding movement within the shank is retained against movement initially by catch means engaged with the striker in response to firing of the gun whilst a driving member of a mechanism actuated upon breech opening stresses the spring and imparts initial rearward movement positively to the extractor member preferably after some degree of breech opening has taken place at a speed controlled by that of opening of the breech, further opening of the latter serving to release the catch means and allow the striker to travel rearwardly within the shank of the extractor member ultimately abutting part thereof to impart a rapid rearward movement to the ejector member causing it to eject the cartridge.

A specific construction of ejector mecha-

nism and cocking mechanism according to the invention will now be described.

Referring now to a specific form of ejector mechanism according to the invention this will be described as applied to a gun having a barrel block as above described but it will be understood that the ejector mechanism could be utilised in conjunction with conventional barrel assemblies or units of either double barrelled or single barrelled guns.

The ejector mechanism in this form comprises an extractor member having at its rearward end an extractor plate or finger which is seated in a recess adjacent to the rearward mouth of the bore extending through the barrel concerned, so that a part of the extractor plate or finger engages beneath, i.e. forwardly of a cartridge rim when such cartridge is loaded into the breech.

A further part of the extractor member consists of a forwardly extending shank which may be of hollow tubular form and which enters a passageway of corresponding cross-section extending into the barrel block in a direction parallel to the barrel.

The walls of this passageway act as a guide for the shank of the extractor member so that the latter can slide rectilinearly forwardly and rearwardly in a direction parallel to the barrel.

Entering the interior of the tubular shank of the extractor member is a striker of which the rearward end may be formed as a piston engaging the internal walls of the shank to guide the striker for endwise movement parallel to the length of the shank, the striker having a stem extending forwardly from such piston on which is disposed a coiled compression spring.

At its forward end the stem of the striker is formed or provided with one component of a catch means such as a collar secured to the forward extremity of the stem this collar having triangular or other suitably shaped notch or groove formed in its lower face.

Also entering the forward end of the tubular shank of the extractor member is the rearward end portion of a driving member, this end portion being formed as a hollow spigot fitting slidably within the shank and abutting the forward end of the coiled compression spring so as jointly to be capable of compressing this spring whilst its rearward end is retained by the piston of the striker.

Forwardly of the spigot the driving member may be formed with an elongated body fitting slidably within the passageway of the barrel block such body being hollow to accommodate slidably the collar at the forward end of the striker stem, and being open or slotted at its underside to enable a further component of the catch means as

hereinafter described to co-operate with the collar of the striker.

At its forward extremity the body of the driving member includes a downwardly projecting lug which lies in the path of a further component of the actuating mechanism for the ejector of which the driving member constitutes part, this further component being an inward projection formed integrally with or secured to one of the forward extensions of the side plates of the action body and lying at a position approximately level with and above the pivotal axis of the barrel block.

The further component of the catch means previously referred to may be in the form of a bell-crank lever pivoted about a horizontal axis situated closely beneath the passageway in the barrel block, one arm of this bell-crank lever extending forwardly in an approximately horizontal direction from the pivotal axis, and having an upstanding tooth or pawl near its forward end for engagement in the triangular shaped notch or groove in the collar of the striker. This pawl or tooth may also be of triangular form presenting a vertical or approximately vertical forward face on an inclined rearward face in conformity with like faces of the notch or groove, except that the lower extremity of the vertical face of the groove is somewhat rounded to permit the tooth or pawl to be forced into the groove as hereinafter described. The other arm of the bell-crank lever may depend vertically or approximately so from the pivotal axis and may project beneath the barrel block so as to lie in the path of an upward lug or projection on a cocking rod extending longitudinally of the barrel block beneath it.

The operation of this ejector mechanism is as follows.

Assuming that the breech has been closed but the gun has not yet been fired the extractor member will be pressed fully home with its ejector plate or finger lying in the recess provided, the piston of the striker disposed adjacent to the blind rearward end of the extractor shank, the coiled compression spring unstressed and the spigot of the driving member partly expelled from the shank of the extractor member, such expulsion being arrested by engagement of the lug of the driving member with the inward projection on the side plate of the action housing, the pawl or tooth of the bell-crank lever at this time being out of engagement with the notch or groove in the collar of the striker but resting against the rounded lower extremity of the vertical face of such notch or groove.

Upon firing of the gun the cocking rod has imparted to it a small forward displacement as hereinafter described in more detail and this forward displacement rotates the

bell-crank lever to bring the pawl or tooth fully into engagement with the notch or groove.

Upon subsequent opening of the breech the striker is thus retained in a fixed position relatively to the barrel block whereas the driving member is moved rearwardly in the passageway owing to rotation of the inward projection which engages it about the pivotal axis of the barrel block. Consequently the shoulder of the driving member which is presented at the junction of its spigot and body engages the forward end of the tubular shank of the extractor member and displaces this rearwardly in the passageway at a controlled speed but positively as determined by the speed of opening of the breech.

It will be apparent that since the projection on one of the side plates of the action housing is situated at only a comparatively short radial distance from the pivotal axis, for example about an inch, the leverage obtained will be relatively great and the requisite force will thus be exerted upon the driving member and extractor member to cause the latter to extract the cartridge which will have undergone obturation as a result of firing.

As opening of the breech proceeds the lug at the forward end of the driving member will ultimately be brought into engagement with the forward end of a horizontal arm of the bell-crank lever which end may present an upwardly and forwardly facing curved or cam-shaped surface, thereby resulting in depression and release of the tooth or pawl from the collar of the striker. The coiled compression spring in the shank of the extractor member will at this time be in a compressed state owing to the rearward movement of the driving member and upon release of the collar or striker will be driven rearwardly by this spring to deliver a blow against the rearward or blind end of the shank and cause the extractor member to be moved rearwardly with a velocity sufficient to eject the cartridge completely from the breech.

If the breech were opened without firing occurring the tooth or pawl of the bell-crank lever and would remain disengaged from the collar of the striker so that this would travel rearwardly with the driving member during initial movement of the latter, and no spring imparted blow would be delivered by the striker to the extractor member which would then only perform extraction at controlled speed.

Referring now to a specific form of cocking mechanism which may be employed in conjunction with the specific form of ejector mechanism above described, the cocking mechanism may comprise a tumbler in the form of an upstanding block or bar which

is pivotally mounted above a horizontal axis near its lower end between upstanding lugs or projections on the trigger plate which forms the lower member of the action housing. When the tumbler is driven forwardly its forward face is arranged to engage the rearward end of a firing pin to cause the latter to strike a cartridge, such movement being effected under the influence of a firing spring previously stressed, and upon release of the tumbler from a cocked position in which it is inclined rearwardly from its pivotal axis.

To retain the tumbler in its cocked position prior to firing the boss or part of the tumbler which surrounds its pivotal axis is formed with a bent or rearwardly and approximately radially presented shoulder in which engages the nose of a sear or the like latching member which may be pivoted about a horizontal axis intermediate its ends and displaced out of engagement with the bent by a trigger in the usual manner.

For cocking the tumbler there is provided a cocking rod of which the forwardly extending shank lies on the upper face of the trigger plate and extends beneath the barrel block as previously described, the forward extremity of this shank having an upstanding tooth which co-operates with a forwardly and approximately radially presented shoulder on a part of the barrel block adjacent to its pivotal axis.

The rearward portion of the cocking rod comprises a bar or arm which is cranked or offset upwardly from the shank of the cocking rod which is parallel thereto and is also offset laterally therefrom, these two parts being connected by a vertical or approximately vertical connecting portion which lies in advance of the tumbler.

This rearward arm of the cocking rod is formed with abutments fore-and-aft of the tumbler the former being situated (dependent upon the actual position of the cocking rod) somewhere in the range lying between the vertical plane passing through the pivotal axis of the tumbler and a vertical plane passing through the rearward extremity of the firing pin when in its fired position, whilst the rearward abutment of the cocking rod lies at some distance behind the tumbler, for example 1 inch to 2 inches.

The rearward abutment is slotted or bored and has slidably mounted therein with clearance to execute a limited degree of rocking a driving rod upon which is disposed the firing spring in the form of a coiled compression spring, this rod near its forward end having a pin or collar engaging the forward end of the firing spring the rearward end of which engages the rearward abutment of the cocking rod.

The forward end of the driving rod engages in a recess afforded by the rearward

face of the tumbler such recess lying at a lever intermediate the pivotal axis of the tumbler and the forward abutment of the cocking rod.

The operation of this mechanism is as follows; upon opening of the breech the cocking rod is allowed to travel rearwardly under the influence of the firing spring bearing upon its rearward abutment, and by virtue of the fact that the radial or approximately radial shoulder formed on the barrel block will be withdrawn rearwardly relatively to the action body.

The extent of the rearward displacement of the cocking rod is such that its forward abutment pivots the tumbler rearwardly, the firing spring being completely or substantially completely relaxed and the sear or like latching member falls in bent with the tumbler.

Upon closure of the breech the tumbler is retained in its cocked position by the sear or latch but the cocking rod is driven forwardly by the radial or approximately radial shoulder of the barrel block so that the rearward abutment of the cocking rod slides along the driving rod and compresses the firing spring, the forward abutment of the cocking rod being removed out of contact with the forwardly presented face of the tumbler and situated at a position forwardly of the rearward end of the firing pin when in its unfired position but rearward of this end when in its fired position.

Upon pulling the trigger and releasing the sear or latch from the tumbler the latter is thus pivoted forwardly by the driving rod under the influence of the firing spring and firstly engages the rearward end of its associated firing pin, but, at the forward extremity of its travel, engages also with the forward abutment of the cocking rod and imparts a small forward displacement to the latter so that the tumbler inclines somewhat forwardly.

Owing, however, to the fact that the driving rod engages the tumbler at a position closer to its pivotal axis than does the forward abutment of the cocking rod, although both these components must be exerting equal and opposite forces upon the tumbler, the turning moment exerted by the forward abutment of the cocking rod is greater and consequently restores the tumbler to an upright or approximately upright position, the cocking rod being restrained against further displacement by engagement of its forward tooth with the radial or approximately radial shoulder of the barrel block.

From the foregoing description it will be apparent that this cocking mechanism provides a forward impulse to the cocking rod at the required time to engage the catch means provided in association with the

striker of the ejector mechanism whenever the gun is fired.

5 Furthermore since stressing of the firing spring takes place upon closure of the breech rather than upon opening of the breech as is the normal practice, breech opening is practically unobstructed and is even assisted to some extent by the remaining component of compression in the firing spring after restoration of the tumbler to the upright position.

10 In the foregoing description, reference has been made to constructions of gun wherein the firing pin is separately supported from the tumbler, the former being, for example, 15 slidably mounted for endwise movement in a standing breech or other suitable parts of the action body, and the former being for example pivotally mounted behind the firing

pin so as to strike it and drive it forwardly 20 when the gun is fired. It will, however, be understood that it would be within the scope of the invention for the firing pin to be carried by the tumbler or formed as a part thereof, or alternatively, for the tumbler 25 to be omitted entirely and the firing pin directly spring loaded instead of being indirectly spring loaded as in the construction described through the intermediary of the tumbler. 30

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# 819,800 COMPLETE SPECIFICATION

1 SHEET

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